

P89103 ST25 (4).txt
SEQUENCE LISTING

<110> The University of Newcastle
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Fogg, Mark
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<120> DNA POLYMERASES

<130> P89103PWO

<140> PCT/GB2003/001623

<141> 2003-04-15

<160> 32

<170> PatentIn version 3.1

<210> 1

<211> 776

<212> PRT

<213> Unknown

<220>

<223> Variant derived from Pyrococcus furiosus
Pfu-Polymerase

<400> 1

Met	Ala	Ile	Leu	Asp	Val	Asp	Tyr	Ile	Thr	Glu	Glu	Gly	Lys	Pro
Val														
1				5				10					15	

Ile	Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His
Asp														
		20						25					30	

Arg	Thr	Phe	Arg	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser
Lys														
		35						40					45	

Ile	Glu	Glu	Val	Lys	Lys	Ile	Thr	Gly	Glu	Arg	His	Gly	Lys	Ile
Val														
	50							55					60	

Arg	Ile	Val	Asp	Val	Glu	Lys	Val	Glu	Lys	Lys	Phe	Leu	Gly	Lys
Pro														
65						70					75			
80														

Ile	Thr	Val	Trp	Lys	Leu	Tyr	Leu	Glu	His	Pro	Gln	Asp	Val	Pro
Thr														
				85						90				95

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Ile	Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe
Glu														
			100					105					110	

Tyr	Asp	Ile	Pro	Phe	Ala	Lys	Arg	Tyr	Leu	Ile	Asp	Lys	Gly	Leu
Ile														
		115					120					125		

Pro	Met	Glu	Gly	Glu	Glu	Glu	Leu	Lys	Ile	Leu	Ala	Phe	Asp	Ile
Glu														
	130						135					140		

Thr	Leu	Tyr	His	Glu	Gly	Glu	Glu	Phe	Gly	Lys	Gly	Pro	Ile	Ile
Met														
145						150					155			
160														

Ile	Ser	Tyr	Ala	Asp	Glu	Asn	Glu	Ala	Lys	Val	Ile	Thr	Trp	Lys
Asn														
				165					170					175

Ile	Asp	Leu	Pro	Tyr	Val	Glu	Val	Val	Ser	Ser	Glu	Arg	Glu	Met
Ile														
			180						185				190	

Lys	Arg	Phe	Leu	Arg	Ile	Ile	Arg	Glu	Lys	Asp	Pro	Asp	Ile	Ile
Val														
		195					200					205		

Thr	Tyr	Asn	Gly	Asp	Ser	Phe	Asp	Phe	Pro	Tyr	Leu	Ala	Lys	Arg
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Ala
210

215

220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu
Pro
225
240

230

235

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly
Arg
245

250

255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu
Pro
260

265

270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro
Lys
275

280

285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly
Glu
290

295

300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala
Thr
305
320

310

315

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser
Arg
325

330

335

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Leu	Val	Gly	Gln	Pro	Leu	Trp	Asp	Val	Ser	Arg	Ser	Ser	Thr	Gly
Asn														
			340					345					350	

Leu	Val	Glu	Trp	Phe	Leu	Leu	Arg	Lys	Ala	Tyr	Glu	Arg	Asn	Glu
Val														
		355					360					365		

Ala	Pro	Asn	Lys	Pro	Ser	Glu	Glu	Glu	Tyr	Gln	Arg	Arg	Leu	Arg
Glu														
	370					375					380			

Ser	Tyr	Thr	Gly	Gly	Phe	Val	Lys	Glu	Pro	Glu	Lys	Gly	Leu	Trp
Glu														
385					390					395				
400														

Asn	Ile	Val	Tyr	Leu	Asp	Phe	Arg	Ala	Leu	Tyr	Pro	Ser	Ile	Ile
Ile														
			405						410				415	

Thr	His	Asn	Val	Ser	Pro	Asp	Thr	Leu	Asn	Leu	Glu	Gly	Cys	Lys
Asn														
			420					425					430	

Tyr	Asp	Ile	Ala	Pro	Gln	Val	Gly	His	Lys	Phe	Cys	Lys	Asp	Ile
Pro														
		435					440					445		

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Gly	Phe	Ile	Pro	Ser	Leu	Leu	Gly	His	Leu	Leu	Glu	Glu	Arg	Gln
Lys														
	450					455					460			

Ile	Lys	Thr	Lys	Met	Lys	Glu	Thr	Gln	Asp	Pro	Ile	Glu	Lys	Ile
Leu														
465					470					475				
480														

Leu	Asp	Tyr	Arg	Gln	Lys	Ala	Ile	Lys	Leu	Leu	Ala	Asn	Ser	Phe
Tyr														
				485					490					495

Gly	Tyr	Tyr	Gly	Tyr	Ala	Lys	Ala	Arg	Trp	Tyr	Cys	Lys	Glu	Cys
Ala														
			500					505					510	

Glu	ser	Val	Thr	Ala	Trp	Gly	Arg	Lys	Tyr	Ile	Glu	Leu	Val	Trp
Lys														
		515					520					525		

Glu	Leu	Glu	Glu	Lys	Phe	Gly	Phe	Lys	Val	Leu	Tyr	Ile	Asp	Thr
Asp														
	530					535					540			

Gly	Leu	Tyr	Ala	Thr	Ile	Pro	Gly	Gly	Glu	Ser	Glu	Glu	Ile	Lys
Lys														
545					550					555				
560														

Lys	Ala	Leu	Glu	Phe	Val	Lys	Tyr	Ile	Asn	Ser	Lys	Leu	Pro	Gly
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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Leu 565 570 575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val
Thr 580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr
Arg 595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu
Thr 610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu
Glu 625 630 635
640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr
Glu 645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro
Leu 660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys
Leu 675 680 685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr
Ile
690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala
Glu
705 710 715
720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile
Glu
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly
Tyr
740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu
Thr
755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser
770 775

<210> 2

<211> 775

<212> PRT

<213> Pyrococcus furiosus

<400> 2

Met	Ile	Leu	Asp	Val	Asp	Tyr	Ile	Thr	Glu	Glu	Gly	Lys	Pro	Val
Ile														
1				5					10					15

Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His	Asp
Arg														
			20					25					30	

Thr	Phe	Arg	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser	Lys
Ile														
		35					40						45	

Glu	Glu	Val	Lys	Lys	Ile	Thr	Gly	Glu	Arg	His	Gly	Lys	Ile	Val
Arg														
	50					55					60			

Ile	Val	Asp	Val	Glu	Lys	Val	Glu	Lys	Lys	Phe	Leu	Gly	Lys	Pro
Ile														
65					70					75				
80														

Thr	Val	Trp	Lys	Leu	Tyr	Leu	Glu	His	Pro	Gln	Asp	Val	Pro	Thr
Ile														
			85						90				95	

Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe	Glu
Tyr														
			100					105					110	

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile
Pro

115

120

125

Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile Glu
Thr

130

135

140

Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile Met
Ile

145

150

155

160

Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys Asn
Ile

165

170

175

Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met Ile
Lys

180

185

190

Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile Val
Thr

195

200

205

Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg Ala
Glu

210

215

220

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Lys	Leu	Gly	Ile	Lys	Leu	Thr	Ile	Gly	Arg	Asp	Gly	Ser	Glu	Pro
Lys														
225					230					235				
240														

Met	Gln	Arg	Ile	Gly	Asp	Met	Thr	Ala	Val	Glu	Val	Lys	Gly	Arg
Ile														
				245					250					255

His	Phe	Asp	Leu	Tyr	His	Val	Ile	Thr	Arg	Thr	Ile	Asn	Leu	Pro
Thr														
			260					265					270	

Tyr	Thr	Leu	Glu	Ala	Val	Tyr	Glu	Ala	Ile	Phe	Gly	Lys	Pro	Lys
Glu														
		275					280					285		

Lys	Val	Tyr	Ala	Asp	Glu	Ile	Ala	Lys	Ala	Trp	Glu	Ser	Gly	Glu
Asn														
	290					295					300			

Leu	Glu	Arg	Val	Ala	Lys	Tyr	Ser	Met	Glu	Asp	Ala	Lys	Ala	Thr
Tyr														
305					310					315				
320														

Glu	Leu	Gly	Lys	Glu	Phe	Leu	Pro	Met	Glu	Ile	Gln	Leu	Ser	Arg
Leu														
				325					330					335

Val	Gly	Gln	Pro	Leu	Trp	Asp	Val	Ser	Arg	Ser	Ser	Thr	Gly	Asn
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Leu

340

345

350

Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Val
Ala
355 360 365

Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg Glu
Ser
370 375 380

Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp Glu
Asn
385 390 395
400

Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile Ile
Thr
405 410 415

His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys Asn
Tyr
420 425 430

Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile Pro
Gly
435 440 445

Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln Lys
Ile
450 455 460

Lys	Thr	Lys	Met	Lys	Glu	Thr	Gln	Asp	Pro	Ile	Glu	Lys	Ile	Leu
Leu														
465					470					475				
480														

Asp	Tyr	Arg	Gln	Lys	Ala	Ile	Lys	Leu	Leu	Ala	Asn	Ser	Phe	Tyr
Gly														
				485					490					495

Tyr	Tyr	Gly	Tyr	Ala	Lys	Ala	Arg	Trp	Tyr	Cys	Lys	Glu	Cys	Ala
Glu														
			500					505					510	

Ser	Val	Thr	Ala	Trp	Gly	Arg	Lys	Tyr	Ile	Glu	Leu	Val	Trp	Lys
Glu														
		515					520					525		

Leu	Glu	Glu	Lys	Phe	Gly	Phe	Lys	Val	Leu	Tyr	Ile	Asp	Thr	Asp
Gly														
	530					535						540		

Leu	Tyr	Ala	Thr	Ile	Pro	Gly	Gly	Glu	Ser	Glu	Glu	Ile	Lys	Lys
Lys														
545					550					555				
560														

Ala	Leu	Glu	Phe	Val	Lys	Tyr	Ile	Asn	Ser	Lys	Leu	Pro	Gly	Leu
Leu														
				565					570					575

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Glu	Leu	Glu	Tyr	Glu	Gly	Phe	Tyr	Lys	Arg	Gly	Phe	Phe	Val	Thr
Lys														
			580					585					590	

Lys	Arg	Tyr	Ala	Val	Ile	Asp	Glu	Glu	Gly	Lys	Val	Ile	Thr	Arg
Gly														
		595				600						605		

Leu	Glu	Ile	Val	Arg	Arg	Asp	Trp	Ser	Glu	Ile	Ala	Lys	Glu	Thr
Gln														
	610					615						620		

Ala	Arg	Val	Leu	Glu	Thr	Ile	Leu	Lys	His	Gly	Asp	Val	Glu	Glu
Ala														
625						630				635				
640														

Val	Arg	Ile	Val	Lys	Glu	Val	Ile	Gln	Lys	Leu	Ala	Asn	Tyr	Glu
Ile														
			645					650					655	

Pro	Pro	Glu	Lys	Leu	Ala	Ile	Tyr	Glu	Gln	Ile	Thr	Arg	Pro	Leu
His														
			660					665					670	

Glu	Tyr	Lys	Ala	Ile	Gly	Pro	His	Val	Ala	Val	Ala	Lys	Lys	Leu
Ala														
		675				680						685		

Ala	Lys	Gly	Val	Lys	Ile	Lys	Pro	Gly	Met	Val	Ile	Gly	Tyr	Ile
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P89103 ST25 (4).txt

Val

690

695

700

Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala Glu
 Glu
 705 710 715
 720

Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu
 Asn
 725 730 735

Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly Tyr
 Arg
 740 745 750

Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Thr
 Ser
 755 760 765

Trp Leu Asn Ile Lys Lys Ser
 770 775

<210> 3

<211> 776

<212> PRT

<213> Unknown

<220>

P89103 ST25 (4).txt

<223> Variant derived from Pyrococcus furiosus
Pfu-Polymerase

<400> 3

Met	Ala	Ile	Leu	Asp	Val	Asp	Ala	Ile	Thr	Glu	Glu	Gly	Lys	Pro
Val														
1				5					10					15

Ile	Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His
Asp														
			20					25					30	

Arg	Thr	Phe	Arg	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser
Lys														
		35					40					45		

Ile	Glu	Glu	Val	Lys	Lys	Ile	Thr	Gly	Glu	Arg	His	Gly	Lys	Ile
Val														
	50					55					60			

Arg	Ile	Val	Asp	Val	Glu	Lys	Val	Glu	Lys	Lys	Phe	Leu	Gly	Lys
Pro														
65					70					75				
80														

Ile	Thr	Val	Trp	Lys	Leu	Tyr	Leu	Glu	His	Pro	Gln	Asp	Val	Pro
Thr														
				85					90				95	

Ile	Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe
Glu														

100

105

110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu
 Ile
 115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile
 Glu
 130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile
 Met
 145 150 155
 160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys
 Asn
 165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met
 Ile
 180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile
 Val
 195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg
 Ala
 210 215 220

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Glu	Lys	Leu	Gly	Ile	Lys	Leu	Thr	Ile	Gly	Arg	Asp	Gly	Ser	Glu
Pro														
225					230					235				
240														

Lys	Met	Gln	Arg	Ile	Gly	Asp	Met	Thr	Ala	Val	Glu	Val	Lys	Gly
Arg														
				245					250					255

Ile	His	Phe	Asp	Leu	Tyr	His	Val	Ile	Thr	Arg	Thr	Ile	Asn	Leu
Pro														
			260					265					270	

Thr	Tyr	Thr	Leu	Glu	Ala	Val	Tyr	Glu	Ala	Ile	Phe	Gly	Lys	Pro
Lys														
		275						280				285		

Glu	Lys	Val	Tyr	Ala	Asp	Glu	Ile	Ala	Lys	Ala	Trp	Glu	Ser	Gly
Glu														
	290					295					300			

Asn	Leu	Glu	Arg	Val	Ala	Lys	Tyr	Ser	Met	Glu	Asp	Ala	Lys	Ala
Thr														
305					310					315				
320														

Tyr	Glu	Leu	Gly	Lys	Glu	Phe	Leu	Pro	Met	Glu	Ile	Gln	Leu	Ser
Arg														
				325					330					335

P89103 ST25 (4).txt

Leu	Val	Gly	Gln	Pro	Leu	Trp	Asp	Val	Ser	Arg	Ser	Ser	Thr	Gly
Asn														
			340					345					350	

Leu	Val	Glu	Trp	Phe	Leu	Leu	Arg	Lys	Ala	Tyr	Glu	Arg	Asn	Glu
Val														
		355					360					365		

Ala	Pro	Asn	Lys	Pro	Ser	Glu	Glu	Glu	Tyr	Gln	Arg	Arg	Leu	Arg
Glu														
	370					375					380			

Ser	Tyr	Thr	Gly	Gly	Phe	Val	Lys	Glu	Pro	Glu	Lys	Gly	Leu	Trp
Glu														
385					390					395				
400														

Asn	Ile	Val	Tyr	Leu	Asp	Phe	Arg	Ala	Leu	Tyr	Pro	Ser	Ile	Ile
Ile														
			405						410				415	

Thr	His	Asn	Val	Ser	Pro	Asp	Thr	Leu	Asn	Leu	Glu	Gly	Cys	Lys
Asn														
			420					425					430	

Tyr	Asp	Ile	Ala	Pro	Gln	Val	Gly	His	Lys	Phe	Cys	Lys	Asp	Ile
Pro														
		435					440					445		

Gly	Phe	Ile	Pro	Ser	Leu	Leu	Gly	His	Leu	Leu	Glu	Glu	Arg	Gln
Lys														

450

460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile
Leu
465 470 475
480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe
Tyr
485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys
Ala
500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp
Lys
515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr
Asp
530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys
Lys
545 550 555
560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly
Leu
565 570 575

Leu	Glu	Leu	Glu	Tyr	Glu	Gly	Phe	Tyr	Lys	Arg	Gly	Phe	Phe	Val
Thr														
			580					585					590	

Lys	Lys	Arg	Tyr	Ala	Val	Ile	Asp	Glu	Glu	Gly	Lys	Val	Ile	Thr
Arg														
		595					600					605		

Gly	Leu	Glu	Ile	Val	Arg	Arg	Asp	Trp	Ser	Glu	Ile	Ala	Lys	Glu
Thr														
	610					615					620			

Gln	Ala	Arg	Val	Leu	Glu	Thr	Ile	Leu	Lys	His	Gly	Asp	Val	Glu
Glu														
625					630					635				
640														

Ala	Val	Arg	Ile	Val	Lys	Glu	Val	Ile	Gln	Lys	Leu	Ala	Asn	Tyr
Glu														
			645						650				655	

Ile	Pro	Pro	Glu	Lys	Leu	Ala	Ile	Tyr	Glu	Gln	Ile	Thr	Arg	Pro
Leu														
			660					665					670	

His	Glu	Tyr	Lys	Ala	Ile	Gly	Pro	His	Val	Ala	Val	Ala	Lys	Lys
Leu														
		675				680						685		

P89103 ST25 (4).txt

Ala	Ala	Lys	Gly	Val	Lys	Ile	Lys	Pro	Gly	Met	Val	Ile	Gly	Tyr
Ile														
	690					695						700		

Val	Leu	Arg	Gly	Asp	Gly	Pro	Ile	Ser	Asn	Arg	Ala	Ile	Leu	Ala
Glu														
705						710						715		
720														

Glu	Tyr	Asp	Pro	Lys	Lys	His	Lys	Tyr	Asp	Ala	Glu	Tyr	Tyr	Ile
Glu														
				725					730					735

Asn	Gln	Val	Leu	Pro	Ala	Val	Leu	Arg	Ile	Leu	Glu	Gly	Phe	Gly
Tyr														
			740					745					750	

Arg	Lys	Glu	Asp	Leu	Arg	Tyr	Gln	Lys	Thr	Arg	Gln	Val	Gly	Leu
Thr														
		755					760					765		

Ser	Trp	Leu	Asn	Ile	Lys	Lys	Ser
770						775	

<210> 4

<211> 776

<212> PRT

<213> Unknown

<220>

<223> Variant derived from Pyrococcus furiosus
Pfu-Polymerase

<400> 4

Met	Ala	Ile	Leu	Asp	Val	Asp	Tyr	Ile	Thr	Glu	Glu	Gly	Lys	Pro
Val														
1				5				10					15	

Ile	Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His
Asp														
		20					25					30		

Arg	Thr	Phe	Arg	Pro	Ala	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser
Lys														
		35					40					45		

Ile	Glu	Glu	Val	Lys	Lys	Ile	Thr	Gly	Glu	Arg	His	Gly	Lys	Ile
Val														
	50					55					60			

Arg	Ile	Val	Asp	Val	Glu	Lys	Val	Glu	Lys	Lys	Phe	Leu	Gly	Lys
Pro														
65					70					75				
80														

Ile	Thr	Val	Trp	Lys	Leu	Tyr	Leu	Glu	His	Pro	Gln	Asp	Val	Pro
Thr														
				85					90				95	

Ile	Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

P89103 ST25 (4).txt

Glu

100

105

110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu
Ile
115 120 125

Pro Met Glu Gly Glu Glu Glu Leu Lys Ile Leu Ala Phe Asp Ile
Glu
130 135 140

Thr Leu Tyr His Glu Gly Glu Glu Phe Gly Lys Gly Pro Ile Ile
Met
145 150 155
160

Ile Ser Tyr Ala Asp Glu Asn Glu Ala Lys Val Ile Thr Trp Lys
Asn
165 170 175

Ile Asp Leu Pro Tyr Val Glu Val Val Ser Ser Glu Arg Glu Met
Ile
180 185 190

Lys Arg Phe Leu Arg Ile Ile Arg Glu Lys Asp Pro Asp Ile Ile
Val
195 200 205

Thr Tyr Asn Gly Asp Ser Phe Asp Phe Pro Tyr Leu Ala Lys Arg
Ala
210 215 220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu
 Pro
 225 230 235
 240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly
 Arg
 245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu
 Pro
 260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro
 Lys
 275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly
 Glu
 290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala
 Thr
 305 310 315
 320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser
 Arg
 325 330 335

P89103 ST25 (4).txt

Leu	Val	Gly	Gln	Pro	Leu	Trp	Asp	Val	Ser	Arg	Ser	Ser	Thr	Gly
Asn														
			340					345					350	

Leu	Val	Glu	Trp	Phe	Leu	Leu	Arg	Lys	Ala	Tyr	Glu	Arg	Asn	Glu
Val														
		355					360					365		

Ala	Pro	Asn	Lys	Pro	Ser	Glu	Glu	Glu	Tyr	Gln	Arg	Arg	Leu	Arg
Glu														
	370					375					380			

Ser	Tyr	Thr	Gly	Gly	Phe	Val	Lys	Glu	Pro	Glu	Lys	Gly	Leu	Trp
Glu														
385					390					395				
400														

Asn	Ile	Val	Tyr	Leu	Asp	Phe	Arg	Ala	Leu	Tyr	Pro	Ser	Ile	Ile
Ile														
			405					410					415	

Thr	His	Asn	Val	Ser	Pro	Asp	Thr	Leu	Asn	Leu	Glu	Gly	Cys	Lys
Asn														
			420					425					430	

Tyr	Asp	Ile	Ala	Pro	Gln	Val	Gly	His	Lys	Phe	Cys	Lys	Asp	Ile
Pro														
		435					440					445		

Gly	Phe	Ile	Pro	Ser	Leu	Leu	Gly	His	Leu	Leu	Glu	Glu	Arg	Gln
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

P89103 ST25 (4).txt

Lys

450

455

460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile
Leu
465
480

470

475

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe
Tyr

485

490

495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys
Ala

500

505

510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp
Lys

515

520

525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr
Asp

530

535

540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys
Lys
545
560

550

555

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly
Leu

565

570

575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val
 Thr
 580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr
 Arg
 595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu
 Thr
 610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu
 Glu
 625 630 635
 640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr
 Glu
 645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro
 Leu
 660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys
 Leu
 675 680 685

P89103 ST25 (4).txt

Ala	Ala	Lys	Gly	Val	Lys	Ile	Lys	Pro	Gly	Met	Val	Ile	Gly	Tyr
Ile														
	690					695						700		

Val	Leu	Arg	Gly	Asp	Gly	Pro	Ile	Ser	Asn	Arg	Ala	Ile	Leu	Ala
Glu														
705						710						715		
720														

Glu	Tyr	Asp	Pro	Lys	Lys	His	Lys	Tyr	Asp	Ala	Glu	Tyr	Tyr	Ile
Glu														
				725					730					735

Asn	Gln	Val	Leu	Pro	Ala	Val	Leu	Arg	Ile	Leu	Glu	Gly	Phe	Gly
Tyr														
			740					745					750	

Arg	Lys	Glu	Asp	Leu	Arg	Tyr	Gln	Lys	Thr	Arg	Gln	Val	Gly	Leu
Thr														
		755					760					765		

Ser	Trp	Leu	Asn	Ile	Lys	Lys	Ser
770						775	

- <210> 5
- <211> 776
- <212> PRT
- <213> Unknown

<220>

<223> Variant derived from *Pyrococcus furiosus*
Pfu-Polymerase

<400> 5

Met	Ala	Ile	Leu	Asp	Val	Asp	Tyr	Ile	Thr	Glu	Glu	Gly	Lys	Pro
Val														
1				5				10					15	

Ile	Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His
Asp														
		20					25					30		

Arg	Thr	Phe	Arg	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser
Lys														
		35				40					45			

Ile	Glu	Glu	Val	Lys	Lys	Ile	Thr	Gly	Glu	Arg	His	Gly	Lys	Ile
Val														
	50					55					60			

Arg	Ile	Val	Asp	Val	Glu	Lys	Val	Glu	Lys	Lys	Phe	Leu	Gly	Lys
Pro														
65					70					75				
80														

Ile	Thr	Val	Trp	Lys	Leu	Tyr	Leu	Glu	His	Pro	Gln	Asp	Gln	Pro
Thr														
				85					90				95	

P89103 ST25 (4).txt

Ile	Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe
Glu														
			100					105					110	

Tyr	Asp	Ile	Pro	Phe	Ala	Lys	Arg	Tyr	Leu	Ile	Asp	Lys	Gly	Leu
Ile														
		115					120					125		

Pro	Met	Glu	Gly	Glu	Glu	Glu	Leu	Lys	Ile	Leu	Ala	Phe	Asp	Ile
Glu														
	130						135				140			

Thr	Leu	Tyr	His	Glu	Gly	Glu	Glu	Phe	Gly	Lys	Gly	Pro	Ile	Ile
Met														
145						150				155				
160														

Ile	Ser	Tyr	Ala	Asp	Glu	Asn	Glu	Ala	Lys	Val	Ile	Thr	Trp	Lys
Asn														
				165					170					175

Ile	Asp	Leu	Pro	Tyr	Val	Glu	Val	Val	Ser	Ser	Glu	Arg	Glu	Met
Ile														
			180					185					190	

Lys	Arg	Phe	Leu	Arg	Ile	Ile	Arg	Glu	Lys	Asp	Pro	Asp	Ile	Ile
Val														
		195					200				205			

Thr	Tyr	Asn	Gly	Asp	Ser	Phe	Asp	Phe	Pro	Tyr	Leu	Ala	Lys	Arg
Ala														

210

220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu
Pro
225 230 235
240

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly
Arg
245 250 255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu
Pro
260 265 270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro
Lys
275 280 285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly
Glu
290 295 300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala
Thr
305 310 315
320

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser
Arg
325 330 335

P89103 ST25 (4).txt

Leu	Val	Gly	Gln	Pro	Leu	Trp	Asp	Val	Ser	Arg	Ser	Ser	Thr	Gly
Asn														
			340					345					350	

Leu	Val	Glu	Trp	Phe	Leu	Leu	Arg	Lys	Ala	Tyr	Glu	Arg	Asn	Glu
Val														
			355					360					365	

Ala	Pro	Asn	Lys	Pro	Ser	Glu	Glu	Glu	Tyr	Gln	Arg	Arg	Leu	Arg
Glu														
			370					375					380	

Ser	Tyr	Thr	Gly	Gly	Phe	Val	Lys	Glu	Pro	Glu	Lys	Gly	Leu	Trp
Glu														
385							390					395		
400														

Asn	Ile	Val	Tyr	Leu	Asp	Phe	Arg	Ala	Leu	Tyr	Pro	Ser	Ile	Ile
Ile														
				405						410				415

Thr	His	Asn	Val	Ser	Pro	Asp	Thr	Leu	Asn	Leu	Glu	Gly	Cys	Lys
Asn														
			420							425				430

Tyr	Asp	Ile	Ala	Pro	Gln	Val	Gly	His	Lys	Phe	Cys	Lys	Asp	Ile
Pro														
			435							440				445

P89103 ST25 (4).txt

Gly	Phe	Ile	Pro	Ser	Leu	Leu	Gly	His	Leu	Leu	Glu	Glu	Arg	Gln
Lys														
	450					455					460			

Ile	Lys	Thr	Lys	Met	Lys	Glu	Thr	Gln	Asp	Pro	Ile	Glu	Lys	Ile
Leu														
465					470					475				
480														

Leu	Asp	Tyr	Arg	Gln	Lys	Ala	Ile	Lys	Leu	Leu	Ala	Asn	Ser	Phe
Tyr														
				485					490					495

Gly	Tyr	Tyr	Gly	Tyr	Ala	Lys	Ala	Arg	Trp	Tyr	Cys	Lys	Glu	Cys
Ala														
			500					505					510	

Glu	Ser	Val	Thr	Ala	Trp	Gly	Arg	Lys	Tyr	Ile	Glu	Leu	Val	Trp
Lys														
		515					520					525		

Glu	Leu	Glu	Glu	Lys	Phe	Gly	Phe	Lys	Val	Leu	Tyr	Ile	Asp	Thr
Asp														
	530					535					540			

Gly	Leu	Tyr	Ala	Thr	Ile	Pro	Gly	Gly	Glu	Ser	Glu	Glu	Ile	Lys
Lys														
545					550					555				
560														

Lys	Ala	Leu	Glu	Phe	Val	Lys	Tyr	Ile	Asn	Ser	Lys	Leu	Pro	Gly
Leu														

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val
Thr
580 585 590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr
Arg
595 600 605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu
Thr
610 615 620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu
Glu
625 630 635
640

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr
Glu
645 650 655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro
Leu
660 665 670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys
Leu
675 680 685

P89103 ST25 (4).txt

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr
Ile
690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala
Glu
705 710 715
720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile
Glu
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly
Tyr
740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu
Thr
755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser
770 775

<210> 6

<211> 776

<212> PRT

<213> Unknown

<220>

<223> variant derived from Pyrococcus furiosus
Pfu-Polymerase

<400> 6

Met Ala Ile Leu Asp Val Asp Tyr Ile Thr Glu Glu Gly Lys Pro
Val
1 5 10 15

Ile Arg Leu Phe Lys Lys Glu Asn Gly Lys Phe Lys Ile Glu His
Asp
20 25 30

Arg Thr Phe Arg Pro Tyr Ile Tyr Ala Leu Leu Arg Asp Asp Ser
Lys
35 40 45

Ile Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile
Val
50 55 60

Arg Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys
Pro
65 70 75
80

Ile Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Arg Pro
Thr
85 90 95

P89103 ST25 (4).txt

Ile	Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe
Glu														
			100					105					110	

Tyr	Asp	Ile	Pro	Phe	Ala	Lys	Arg	Tyr	Leu	Ile	Asp	Lys	Gly	Leu
Ile														
		115					120					125		

Pro	Met	Glu	Gly	Glu	Glu	Glu	Leu	Lys	Ile	Leu	Ala	Phe	Asp	Ile
Glu														
	130						135					140		

Thr	Leu	Tyr	His	Glu	Gly	Glu	Glu	Phe	Gly	Lys	Gly	Pro	Ile	Ile
Met														
145						150					155			
160														

Ile	Ser	Tyr	Ala	Asp	Glu	Asn	Glu	Ala	Lys	Val	Ile	Thr	Trp	Lys
Asn														
				165					170					175

Ile	Asp	Leu	Pro	Tyr	Val	Glu	Val	Val	Ser	Ser	Glu	Arg	Glu	Met
Ile														
			180						185				190	

Lys	Arg	Phe	Leu	Arg	Ile	Ile	Arg	Glu	Lys	Asp	Pro	Asp	Ile	Ile
Val														
			195				200					205		

Thr	Tyr	Asn	Gly	Asp	Ser	Phe	Asp	Phe	Pro	Tyr	Leu	Ala	Lys	Arg
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

P89103 ST25 (4).txt

Ala

210

215

220

Glu Lys Leu Gly Ile Lys Leu Thr Ile Gly Arg Asp Gly Ser Glu
Pro
225
240

230

235

Lys Met Gln Arg Ile Gly Asp Met Thr Ala Val Glu Val Lys Gly
Arg

245

250

255

Ile His Phe Asp Leu Tyr His Val Ile Thr Arg Thr Ile Asn Leu
Pro

260

265

270

Thr Tyr Thr Leu Glu Ala Val Tyr Glu Ala Ile Phe Gly Lys Pro
Lys

275

280

285

Glu Lys Val Tyr Ala Asp Glu Ile Ala Lys Ala Trp Glu Ser Gly
Glu

290

295

300

Asn Leu Glu Arg Val Ala Lys Tyr Ser Met Glu Asp Ala Lys Ala
Thr
305
320

310

315

Tyr Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ile Gln Leu Ser
Arg

325

330

335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly
 Asn
 340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu
 Val
 355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg
 Glu
 370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp
 Glu
 385 390 395
 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile
 Ile
 405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys
 Asn
 420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile
 Pro
 435 440 445

P89103 ST25 (4).txt

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln
 Lys
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile
 Leu
 465 470 475
 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe
 Tyr
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys
 Ala
 500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp
 Lys
 515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr
 Asp
 530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys
 Lys
 545 550 555
 560

Lys Ala Leu Glu Phe Val Lys Tyr Ile Asn Ser Lys Leu Pro Gly

P89103 ST25 (4).txt

Leu

565

570

575

Leu Glu Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val
Thr

580

585

590

Lys Lys Arg Tyr Ala Val Ile Asp Glu Glu Gly Lys Val Ile Thr
Arg

595

600

605

Gly Leu Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu
Thr

610

615

620

Gln Ala Arg Val Leu Glu Thr Ile Leu Lys His Gly Asp Val Glu
Glu
625
640

630

635

Ala Val Arg Ile Val Lys Glu Val Ile Gln Lys Leu Ala Asn Tyr
Glu

645

650

655

Ile Pro Pro Glu Lys Leu Ala Ile Tyr Glu Gln Ile Thr Arg Pro
Leu

660

665

670

His Glu Tyr Lys Ala Ile Gly Pro His Val Ala Val Ala Lys Lys
Leu

675

680

685

Ala	Ala	Lys	Gly	Val	Lys	Ile	Lys	Pro	Gly	Met	Val	Ile	Gly	Tyr
Ile														
	690					695						700		

Val	Leu	Arg	Gly	Asp	Gly	Pro	Ile	Ser	Asn	Arg	Ala	Ile	Leu	Ala
Glu														
705						710						715		
720														

Glu	Tyr	Asp	Pro	Lys	Lys	His	Lys	Tyr	Asp	Ala	Glu	Tyr	Tyr	Ile
Glu														
				725					730					735

Asn	Gln	Val	Leu	Pro	Ala	Val	Leu	Arg	Ile	Leu	Glu	Gly	Phe	Gly
Tyr														
			740					745					750	

Arg	Lys	Glu	Asp	Leu	Arg	Tyr	Gln	Lys	Thr	Arg	Gln	Val	Gly	Leu
Thr														
		755					760					765		

Ser	Trp	Leu	Asn	Ile	Lys	Lys	Ser
	770					775	

<210> 7

<211> 776

<212> PRT

<213> Unknown

<220>

<223> Variant derived from Pyrococcus furiosus
Pfu-Polymerase

<400> 7

Met	Ala	Ile	Leu	Asp	Val	Asp	Ala	Ile	Thr	Glu	Glu	Gly	Lys	Pro
Val														
1				5					10					15

Ile	Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His
Asp														
		20						25					30	

Arg	Thr	Phe	Arg	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser
Lys														
		35					40					45		

Ile	Glu	Glu	Val	Lys	Lys	Ile	Thr	Gly	Glu	Arg	His	Gly	Lys	Ile
Val														
	50					55					60			

Arg	Ile	Val	Asp	Val	Glu	Lys	Val	Glu	Lys	Lys	Phe	Leu	Gly	Lys
Pro														
65					70					75				
80														

Ile	Thr	Val	Trp	Lys	Leu	Tyr	Leu	Glu	His	Pro	Gln	Asp	Val	Pro
Thr														
				85						90				95

P89103 ST25 (4).txt

Ile	Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe
Glu														
			100					105					110	

Tyr	Asp	Arg	Pro	Phe	Ala	Lys	Arg	Tyr	Leu	Ile	Asp	Lys	Gly	Leu
Ile														
			115					120				125		

Pro	Met	Glu	Gly	Glu	Glu	Glu	Leu	Lys	Ile	Leu	Ala	Phe	Asp	Ile
Glu														
	130						135				140			

Thr	Leu	Tyr	His	Glu	Gly	Glu	Glu	Phe	Gly	Lys	Gly	Pro	Ile	Ile
Met														
145						150					155			
160														

Ile	Ser	Tyr	Ala	Asp	Glu	Asn	Glu	Ala	Lys	Val	Ile	Thr	Trp	Lys
Asn														
				165					170					175

Ile	Asp	Leu	Pro	Tyr	Val	Glu	Val	Val	Ser	Ser	Glu	Arg	Glu	Met
Ile														
			180						185				190	

Lys	Arg	Phe	Leu	Arg	Ile	Ile	Arg	Glu	Lys	Asp	Pro	Asp	Ile	Ile
Val														
			195					200				205		

P89103 ST25 (4).txt

Thr	Tyr	Asn	Gly	Asp	Ser	Phe	Asp	Phe	Pro	Tyr	Leu	Ala	Lys	Arg
Ala														
	210					215					220			

Glu	Lys	Leu	Gly	Ile	Lys	Leu	Thr	Ile	Gly	Arg	Asp	Gly	Ser	Glu
Pro														
225					230					235				
240														

Lys	Met	Gln	Arg	Ile	Gly	Asp	Met	Thr	Ala	Val	Glu	Val	Lys	Gly
Arg														
			245						250					255

Ile	His	Phe	Asp	Leu	Tyr	His	Val	Ile	Thr	Arg	Thr	Ile	Asn	Leu
Pro														
			260					265					270	

Thr	Tyr	Thr	Leu	Glu	Ala	Val	Tyr	Glu	Ala	Ile	Phe	Gly	Lys	Pro
Lys														
		275					280					285		

Glu	Lys	Val	Tyr	Ala	Asp	Glu	Ile	Ala	Lys	Ala	Trp	Glu	Ser	Gly
Glu														
	290					295					300			

Asn	Leu	Glu	Arg	Val	Ala	Lys	Tyr	Ser	Met	Glu	Asp	Ala	Lys	Ala
Thr														
305					310					315				
320														

Tyr	Glu	Leu	Gly	Lys	Glu	Phe	Leu	Pro	Met	Glu	Ile	Gln	Leu	Ser
Arg														

325

330

335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly
 Asn
 340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu
 Val
 355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg
 Glu
 370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp
 Glu
 385 390 395
 400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile
 Ile
 405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys
 Asn
 420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile
 Pro
 435 440 445

P89103 ST25 (4).txt

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln
 Lys
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile
 Leu
 465 470 475
 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe
 Tyr
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys
 Ala
 500 505 510

Glu Ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp
 Lys
 515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr
 Asp
 530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys
 Lys
 545 550 555
 560

P89103 ST25 (4).txt

Lys	Ala	Leu	Glu	Phe	Val	Lys	Tyr	Ile	Asn	Ser	Lys	Leu	Pro	Gly
Leu														
				565					570					575

Leu	Glu	Leu	Glu	Tyr	Glu	Gly	Phe	Tyr	Lys	Arg	Gly	Phe	Phe	Val
Thr														
				580					585					590

Lys	Lys	Arg	Tyr	Ala	Val	Ile	Asp	Glu	Glu	Gly	Lys	Val	Ile	Thr
Arg														
				595				600					605	

Gly	Leu	Glu	Ile	Val	Arg	Arg	Asp	Trp	Ser	Glu	Ile	Ala	Lys	Glu
Thr														
	610						615					620		

Gln	Ala	Arg	Val	Leu	Glu	Thr	Ile	Leu	Lys	His	Gly	Asp	Val	Glu
Glu														
625							630				635			
640														

Ala	Val	Arg	Ile	Val	Lys	Glu	Val	Ile	Gln	Lys	Leu	Ala	Asn	Tyr
Glu														
					645					650				655

Ile	Pro	Pro	Glu	Lys	Leu	Ala	Ile	Tyr	Glu	Gln	Ile	Thr	Arg	Pro
Leu														
					660					665				670

His	Glu	Tyr	Lys	Ala	Ile	Gly	Pro	His	Val	Ala	Val	Ala	Lys	Lys
Leu														

675

685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr
Ile
690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala
Glu
705 710 715
720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile
Glu
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly
Tyr
740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu
Thr
755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser
770 775

<210> 8

<211> 776

<212> PRT

<213> Unknown

<220>

<223> Variant derived from *Pyrococcus furiosus*
Pfu-Polymerase

<400> 8

Met	Ala	Ile	Leu	Asp	Val	Asp	Tyr	Ile	Thr	Glu	Glu	Gly	Lys	Pro
Val														
1				5				10					15	

Ile	Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His
Asp														
		20						25					30	

Arg	Thr	Phe	Arg	Pro	Ala	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser
Lys														
		35					40					45		

Ile	Glu	Glu	Val	Lys	Lys	Ile	Thr	Gly	Glu	Arg	His	Gly	Lys	Ile
Val														
	50					55					60			

Arg	Ile	Val	Asp	Val	Glu	Lys	Val	Glu	Lys	Lys	Phe	Leu	Gly	Lys
Pro														
65					70					75				
80														

Ile	Thr	Val	Trp	Lys	Leu	Tyr	Leu	Glu	His	Pro	Gln	Asp	Val	Pro
Thr														
				85						90				95

Ile	Arg	Glu	Lys	Val	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Phe
Glu														
			100					105					110	

Tyr	Asp	Gln	Pro	Phe	Ala	Lys	Arg	Tyr	Leu	Ile	Asp	Lys	Gly	Leu
Ile														
		115					120					125		

Pro	Met	Glu	Gly	Glu	Glu	Glu	Leu	Lys	Ile	Leu	Ala	Phe	Asp	Ile
Glu														
	130					135					140			

Thr	Leu	Tyr	His	Glu	Gly	Glu	Glu	Phe	Gly	Lys	Gly	Pro	Ile	Ile
Met														
145					150					155				
160														

Ile	Ser	Tyr	Ala	Asp	Glu	Asn	Glu	Ala	Lys	Val	Ile	Thr	Trp	Lys
Asn														
				165					170					175

Ile	Asp	Leu	Pro	Tyr	Val	Glu	Val	Val	Ser	Ser	Glu	Arg	Glu	Met
Ile														
			180					185					190	

Lys	Arg	Phe	Leu	Arg	Ile	Ile	Arg	Glu	Lys	Asp	Pro	Asp	Ile	Ile
Val														
			195				200					205		

P89103 ST25 (4).txt

Thr	Tyr	Asn	Gly	Asp	Ser	Phe	Asp	Phe	Pro	Tyr	Leu	Ala	Lys	Arg
Ala														
	210					215					220			

Glu	Lys	Leu	Gly	Ile	Lys	Leu	Thr	Ile	Gly	Arg	Asp	Gly	Ser	Glu
Pro														
225					230					235				
240														

Lys	Met	Gln	Arg	Ile	Gly	Asp	Met	Thr	Ala	Val	Glu	Val	Lys	Gly
Arg														
			245						250					255

Ile	His	Phe	Asp	Leu	Tyr	His	Val	Ile	Thr	Arg	Thr	Ile	Asn	Leu
Pro														
			260					265					270	

Thr	Tyr	Thr	Leu	Glu	Ala	Val	Tyr	Glu	Ala	Ile	Phe	Gly	Lys	Pro
Lys														
		275						280				285		

Glu	Lys	Val	Tyr	Ala	Asp	Glu	Ile	Ala	Lys	Ala	Trp	Glu	Ser	Gly
Glu														
	290					295					300			

Asn	Leu	Glu	Arg	Val	Ala	Lys	Tyr	Ser	Met	Glu	Asp	Ala	Lys	Ala
Thr														
305					310					315				
320														

Tyr	Glu	Leu	Gly	Lys	Glu	Phe	Leu	Pro	Met	Glu	Ile	Gln	Leu	Ser
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P89103 ST25 (4).txt

Arg 325 330 335

Leu Val Gly Gln Pro Leu Trp Asp Val Ser Arg Ser Ser Thr Gly
Asn 340 345 350

Leu Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu
Val 355 360 365

Ala Pro Asn Lys Pro Ser Glu Glu Glu Tyr Gln Arg Arg Leu Arg
Glu 370 375 380

Ser Tyr Thr Gly Gly Phe Val Lys Glu Pro Glu Lys Gly Leu Trp
Glu 385 390 395
400

Asn Ile Val Tyr Leu Asp Phe Arg Ala Leu Tyr Pro Ser Ile Ile
Ile 405 410 415

Thr His Asn Val Ser Pro Asp Thr Leu Asn Leu Glu Gly Cys Lys
Asn 420 425 430

Tyr Asp Ile Ala Pro Gln Val Gly His Lys Phe Cys Lys Asp Ile
Pro 435 440 445

Gly Phe Ile Pro Ser Leu Leu Gly His Leu Leu Glu Glu Arg Gln
 Lys
 450 455 460

Ile Lys Thr Lys Met Lys Glu Thr Gln Asp Pro Ile Glu Lys Ile
 Leu
 465 470 475
 480

Leu Asp Tyr Arg Gln Lys Ala Ile Lys Leu Leu Ala Asn Ser Phe
 Tyr
 485 490 495

Gly Tyr Tyr Gly Tyr Ala Lys Ala Arg Trp Tyr Cys Lys Glu Cys
 Ala
 500 505 510

Glu ser Val Thr Ala Trp Gly Arg Lys Tyr Ile Glu Leu Val Trp
 Lys
 515 520 525

Glu Leu Glu Glu Lys Phe Gly Phe Lys Val Leu Tyr Ile Asp Thr
 Asp
 530 535 540

Gly Leu Tyr Ala Thr Ile Pro Gly Gly Glu Ser Glu Glu Ile Lys
 Lys
 545 550 555
 560

P89103 ST25 (4).txt

Lys	Ala	Leu	Glu	Phe	Val	Lys	Tyr	Ile	Asn	Ser	Lys	Leu	Pro	Gly
Leu														
					565				570					575

Leu	Glu	Leu	Glu	Tyr	Glu	Gly	Phe	Tyr	Lys	Arg	Gly	Phe	Phe	Val
Thr														
					580				585					590

Lys	Lys	Arg	Tyr	Ala	Val	Ile	Asp	Glu	Glu	Gly	Lys	Val	Ile	Thr
Arg														
					595				600					605

Gly	Leu	Glu	Ile	Val	Arg	Arg	Asp	Trp	Ser	Glu	Ile	Ala	Lys	Glu
Thr														
					610				615					620

Gln	Ala	Arg	Val	Leu	Glu	Thr	Ile	Leu	Lys	His	Gly	Asp	Val	Glu
Glu														
625														
640														
					630						635			

Ala	Val	Arg	Ile	Val	Lys	Glu	Val	Ile	Gln	Lys	Leu	Ala	Asn	Tyr
Glu														
					645						650			655

Ile	Pro	Pro	Glu	Lys	Leu	Ala	Ile	Tyr	Glu	Gln	Ile	Thr	Arg	Pro
Leu														
					660						665			670

His	Glu	Tyr	Lys	Ala	Ile	Gly	Pro	His	Val	Ala	Val	Ala	Lys	Lys
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

P89103 ST25 (4).txt

Leu

675

680

685

Ala Ala Lys Gly Val Lys Ile Lys Pro Gly Met Val Ile Gly Tyr
Ile
690 695 700

Val Leu Arg Gly Asp Gly Pro Ile Ser Asn Arg Ala Ile Leu Ala
Glu
705 710 715
720

Glu Tyr Asp Pro Lys Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile
Glu
725 730 735

Asn Gln Val Leu Pro Ala Val Leu Arg Ile Leu Glu Gly Phe Gly
Tyr
740 745 750

Arg Lys Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu
Thr
755 760 765

Ser Trp Leu Asn Ile Lys Lys Ser
770 775

<210> 9

<211> 2328

<212> DNA

<213> Unknown

<220>

<223> Variant derived from *Pyrococcus furiosus*
Pfu-Polymerase

<400> 9

atggctatcc tggacgttga cgccatcacc gaagaaggta agccggttat
ccgtctgttc 60

aaaaaagaaa acggtaaatt caaaatcgaa cacgaccgta ctttccgtcc
gtacatctac 120

gctctgctgc gtgacgactc taaaatcgaa gaagttaaaa aaatcaccgg
tgaacgtcat 180

ggaaagattg tgagaattgt tgatgtagag aagggtgaga aaaagtttct
cggcaagcct 240

attaccgtgt ggaaacttta tttggaacat cccaagatg ttcccactat
tagagaaaaa 300

gtagagaaac atccagcagt tgtggacatc ttcgaatacg atattccatt
tgcaagaga 360

tacctcatcg acaaaggcct aataccaatg gagggggaag aagagctaaa
gattcttgcc 420

ttcgatatag aaaccctcta tcacgaagga gaagagtttg gaaaaggccc
aattataatg 480

attagttatg cagatgaaaa tgaagcaaag gtgattactt ggaaaaacat
agatcttcca 540

tacgttgagg ttgtatcaag cgagagagag atgataaaga gatttctcag
gattatcagg 600

gagaaggatc ctgacattat agttacttat aatggagact cattcgactt
cccatattta 660

P89103 ST25 (4).txt

gcgaaaaggg cagaaaaact tgggattaaa ttaaccattg gaagagatgg
aagcgagccc 720

aagatgcaga gaataggcga tatgacggct gtagaagtca agggaagaat
acatttcgac 780

ttgtatcatg taataacaag gacaataaat ctcccaacat acacactaga
ggctgtatat 840

gaagcaattt ttggaaagcc aaaggagaag gtatacgccg acgagatagc
aaaagcctgg 900

gaaagtggag agaaccttga gagagttgcc aaatactcga tggaagatgc
aaaggcaact 960

tatgaactcg ggaaagaatt ccttccaatg gaaattcagc tttcaagatt
agttggacaa 1020

ccttttatggg atgttttcaag gtcaagcaca gggaaaccttg tagagtgggt
cttacttagg 1080

aaagcctacg aaagaaacga agtagctcca aacaagccaa gtgaagagga
gtatcaaaga 1140

aggctcaggg agagctacac aggtggattc gttaaagagc cagaaaaggg
gttggtggaa 1200

aacatagtat acctagattt tagagcccta tatccctcga ttataattac
ccacaatggt 1260

tctcccgata ctctaaatct tgaggggatgc aagaactatg atatcgctcc
tcaagtaggc 1320

cacaagttct gcaaggacat ccctgggtttt ataccaagtc tcttgggaca
tttgtttagag 1380

gaaagacaaa agattaagac aaaaatgaag gaaactcaag atcctataga
aaaaatactc 1440

cttgactata gacaaaaagc gataaaactc ttagcaaatt ctttctacgg
atattatggc 1500

tatgcaaaag caagatggta ctgtaaggag tgtgctgaga gcgttactgc
ctggggaaga 1560

P89103 ST25 (4).txt

aagtacatcg agttagtatg gaaggagctc gaagaaaagt ttggatttaa
agtcctctac 1620

attgacactg atgggtctcta tgcaactatc ccaggaggag aaagtgagga
aataaagaaa 1680

aaggctctag aatttgtaaa atacataaat tcaaagctcc ctggactgct
agagcttgaa 1740

tatgaagggt ttataagag gggattcttc gttacgaaga agaggatatgc
agtaatagat 1800

gaagaaggaa aagtcattac tcgtgggttta gagatagtta ggagagattg
gagtgaatt 1860

gcaaaagaaa ctcaagctag agttttggag acaatactaa aacacggaga
tggtgaagaa 1920

gctgtgagaa tagtaaaaga agtaatacaa aagcttgcca attatgaaat
tccaccagag 1980

aagctcgcaa tatatgagca gataacaaga ccattacatg agtataaggc
gataggtcct 2040

cacgtagctg ttgcaaagaa actagctgct aaaggagtta aaataaagcc
aggaatggta 2100

attggataca tagtacttag aggcgatggc ccaattagca atagggcaat
tctagctgag 2160

gaatacgatc caaaaaagca caagtatgac gcagaatatt acattgagaa
ccaggttctt 2220

ccagcggtag ttaggatatt ggagggattt ggatacagaa aggaagacct
cagataccaa 2280

aagacaagac aagtcggcct aacttcctgg cttaacatta aaaaatcc
2328

<210> 10

<211> 2328

<212> DNA

<213> Unknown

<220>

<223> Variant derived from *Pyrococcus furiosus*
Pfu-Polymerase

<400> 10

atggctatcc tggacgttga ctacatcacc gaagaaggta agccggttat
ccgtctgttc 60

aaaaaagaaa acggtaaatt caaaatcgaa cacgaccgta ccttccgtcc
gtacatctac 120

gctctgctgc gtgacgactc taaaatcgaa gaagttaaaa aaatcaccgg
tgaacgtcat 180

ggaaagattg tgagaattgt tgatgtagag aaggttgaga aaaagtttct
cggcaagcct 240

attaccgtgt ggaaacttta tttggaacat cccaagatc agcccactat
tagagaaaaa 300

gtagagaaac atccagcagt tgtggacatc ttcgaatacg atattccatt
tgcaaagaga 360

tacctcatcg acaaaggcct aataccaatg gagggggaag aagagctaaa
gattcttgcc 420

ttcgatatag aaaccctcta tcacgaagga gaagagtttg gaaaaggccc
aattataatg 480

attagttatg cagatgaaaa tgaagcaaag gtgattactt ggaaaaacat
agatcttcca 540

tacgttgagg ttgtatcaag cgagagagag atgataaaga gatttctcag
gattatcagg 600

gagaaggatc ctgacattat agttacttat aatggagact cattcgactt

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cccatatttta      660
gcgaaaaggg cagaaaaact tgggattaaa ttaaccattg gaagagatgg
aagcgagccc      720
aagatgcaga gaataggcga tatgacggct gtagaagtca agggaagaat
acatttcgac      780
ttgtatcatg taataacaag gacaataaat ctcccaacat acacactaga
ggctgtatat      840
gaagcaattt ttggaaagcc aaaggagaag gtatacgccg acgagatagc
aaaagcctgg      900
gaaagtggag agaaccttga gagagttgcc aaatactcga tggaagatgc
aaaggcaact      960
tatgaactcg ggaaagaatt ccttccaatg gaaattcagc tttcaagatt
agttggacaa     1020
cctttatggg atgttttcaag gtcaagcaca gggaaccttg tagagtggtt
cttacttagg     1080
aaagcctacg aaagaaacga agtagctcca aacaagccaa gtgaagagga
gtatcaaaga     1140
aggctcaggg agagctacac aggtggattc gttaaagagc cagaaaaggg
gttggtgggaa     1200
aacatagtat acctagatth tagagcccta tatccctcga ttataattac
ccacaatgth     1260
tctcccgata ctctaaatct tgaggggatgc aagaactatg atatcgctcc
tcaagtaggc     1320
cacaagttct gcaaggacat ccctggthttt ataccaagtc tcttgggaca
tttgthtagag     1380
gaaagacaaa agattaagac aaaaatgaag gaaactcaag atcctataga
aaaaatactc     1440
cttgactata gacaaaaagc gataaaactc ttagcaaatt ctttctacgg
atattatggc     1500

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P89103 ST25 (4).txt

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ctggggaaga	1560			
aagtacatcg	agttagtatg	gaaggagctc	gaagaaaagt	ttggatttaa
agtcctctac	1620			
attgacactg	atgggtctcta	tgcaactatc	ccaggaggag	aaagtgagga
aataaagaaa	1680			
aaggctctag	aatttgtaaa	atacataaat	tcaaagctcc	ctggactgct
agagcttgaa	1740			
tatgaagggt	tttataagag	gggattcttc	gttacgaaga	agaggtatgc
agtaatagat	1800			
gaagaaggaa	aagtcattac	tcgtgggttta	gagatagtta	ggagagattg
gagtgaatt	1860			
gcaaaagaaa	ctcaagctag	agtttttgag	acaatactaa	aacacggaga
tgttgaagaa	1920			
gctgtgagaa	tagtaaaaga	agtaatacaa	aagcttgcca	attatgaaat
tccaccagag	1980			
aagctcgcaa	tatatgagca	gataacaaga	ccattacatg	agtataaggc
gataggtcct	2040			
cacgtagctg	ttgcaaagaa	actagctgct	aaaggagtta	aaataaagcc
aggaatggta	2100			
attggataca	tagtacttag	aggcgatggg	ccaattagca	atagggcaat
tctagctgag	2160			
gaatacgatc	ccaaaaagca	caagtatgac	gcagaatatt	acattgagaa
ccaggttctt	2220			
ccagcggtac	ttaggatatt	ggagggattt	ggatacagaa	aggaagacct
cagataccaa	2280			
aagacaagac	aagtcggcct	aacttcctgg	cttaacatta	aaaaatcc
	2328			

<210> 11

<211> 2325

<212> DNA

<213> Unknown

<220>

<223> Variant derived from *Pyrococcus furiosus*
Pfu-Polymerase

<400> 11

atggctatcc tggacgttga ctacatcacc gaagaaggta agccggttat
ccgtctgttc 60

aaaaaagaaa acggtaaatt caaaatcgaa cacgaccgta ccttccgtcc
gtacatctac 120

gctctgctgc gtgacgactc taaaatcgaa gaagttaaaa aaatcaccgg
tgaacgtcat 180

ggaaagattg tgagaattgt tgatgtagag aagggttgaga aaaagtttct
cggcaagcct 240

attaccgtgt ggaaacttta tttggaacat cccaagatg ttcccactat
tagagaaaaa 300

gtagagaaac atccagcagt tgtggacatc ttcgaatacg atatTTTTgc
aaagagatac 360

ctcatcgaca aaggcctaata accaatggag ggggaagaag agctaaagat
tcttgccttc 420

gatatagaaa ccctctatca cgaaggagaa gagtttggaa aaggcccaat
tataatgatt 480

agttatgcag atgaaaatga agcaaagggtg attacttgga aaaacataga
tcttccatac 540

gttgagggttg tatcaagcga gagagagatg ataaagagat ttctcaggat
tatcagggag 600

P89103 ST25 (4).txt

aaggatcctg atatttagcg	acattatagt 660	tacttataat	ggagactcat	tcgacttccc
aaaagggcag cgagcccaag	aaaaacttgg 720	gattaaatta	accattggaa	gagatggaag
atgcagagaa tttcgacttg	taggcgatat 780	gacggctgta	gaagtcaagg	gaagaataca
tatcatgtaa tgtatatgaa	taacaaggac 840	aataaatctc	ccaacataca	cactagaggc
gcaatttttg agcctgggaa	gaaagccaaa 900	ggagaaggta	tacgccgacg	agatagcaaa
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gaactcggga tggaacaact	agaatttcct 1020	tccaatggaa	attcagcttt	caagattagt
ttatgggatg acttaggaaa	tttcaaggtc 1080	aagcacaggg	aaccttgtag	agtggttcct
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aagttctgca gtagaggaa	aggacatccc 1380	tggttttata	ccaagtctct	tgggacattt
agacaaaaga aatactcctt	ttaagacaaa 1440	aatgaaggaa	actcaagatc	ctatagaaaa
gactatagac	aaaaagcgat	aaaactctta	gcaaattcct	tctacggata

P89103 ST25 (4).txt

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gggaagaaag 1560
tacatcgagt tagtatggaa ggagctcgaa gaaaagtttg gatttaaagt
cctctacatt 1620
gacactgatg gtctctatgc aactatccca ggaggagaaa gtgaggaaat
aaagaaaaag 1680
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gcttgaatat 1740
gaagggtttt ataagagggg attcttcggt acgaagaaga ggtatgcagt
aatagatgaa 1800
gaaggaaaag tcattactcg tggtttagag atagttagga gagattggag
tgaaattgca 1860
aaagaaactc aagctagagt tttggagaca atactaaaac acggagatgt
tgaagaagct 1920
gtgagaatag taaaagaagt aatacaaaag cttgcccaatt atgaaattcc
accagagaag 1980
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aggtcctcac 2040
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aatggtaatt 2100
ggatacatag tacttagagg cgatgggtcca attagcaata gggcaattct
agctgaggaa 2160
tacgatccca aaaagcacao gtatgacgca gaatattaca ttgagaacca
ggttcttcca 2220
gcggtactta ggatattgga gggatttgga tacagaaagg aagacctcag
ataccaaaag 2280
acaagacaag tcggcctaac ttcctggctt aacattaata aatcc
2325

<210> 12

<211> 130

<212> PRT

<213> Thermococcus gorgonarius

<400> 12

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Ile														
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Arg	Ile	Phe	Lys	Lys	Glu	Asn	Gly	Glu	Phe	Lys	Ile	Asp	Tyr	Asp
Arg														
			20					25					30	

Asn	Phe	Glu	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Lys	Asp	Asp	Ser	Ala
Ile														
			35				40					45		

Glu	Asp	Val	Lys	Lys	Ile	Thr	Ala	Glu	Arg	His	Gly	Thr	Thr	Val
Arg														
	50					55					60			

Val	Val	Arg	Ala	Glu	Lys	Val	Lys	Lys	Lys	Phe	Leu	Gly	Arg	Pro
Ile														
65					70					75				
80														

Glu	Val	Trp	Lys	Leu	Tyr	Phe	Thr	His	Pro	Gln	Asp	Val	Pro	Ala
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

P89103 ST25 (4).txt

Ile

85

90

95

Arg Asp Lys Ile Lys Glu His Pro Ala Val Val Asp Ile Tyr Glu
Tyr
100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile
Pro
115 120 125

Met Glu
130

<210> 13

<211> 103

<212> PRT

<213> RB69

<400> 13

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Phe
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Glu Arg Tyr Ile Asp Ser Asn Gly Arg Glu Arg Thr Arg Glu Val
Glu
20 25 30

P89103 ST25 (4).txt

Tyr Lys Pro Ser Leu Phe Ala His Cys Pro Glu Ser Gln Ala Thr
 Lys 35 40 45

Tyr Phe Asp Ile Tyr Gly Lys Pro Cys Thr Arg Lys Leu Phe Ala
 Asn 50 55 60

Met Arg Asp Ala Ser Gln Trp Ile Lys Arg Met Glu Asp Ile Gly
 Leu 65 70 75
 80

Glu Ala Leu Gly Met Asp Asp Phe Lys Leu Ala Tyr Leu Ser Asp
 Thr 85 90 95

Tyr Asn Tyr Glu Ile Lys Tyr
 100

<210> 14

<211> 24

<212> DNA

<213> Unknown

<220>

<223> Artificial Primer

<400> 14

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24

<210> 15

<211> 44

<212> DNA

<213> Unknown

<220>

<223> Artificial Template

<400> 15

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44

<210> 16

<211> 22

<212> DNA

<213> Unknown

<220>

<223> Artificial Oligodeoxynucleotide

<400> 16

gcccgcggga uatcgccct ta
22

<210> 17

<211> 44

<212> DNA

<213> Unknown

<220>

<223> Artificial Template

<400> 17

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44

<210> 18

<211> 131

<212> PRT

<213> Pyrococcus furiosus

<400> 18

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Ile														
1			5					10					15	

Arg	Leu	Phe	Lys	Lys	Glu	Asn	Gly	Lys	Phe	Lys	Ile	Glu	His	Asp
Arg														
			20					25					30	

Thr	Phe	Arg	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Arg	Asp	Asp	Ser	Lys
Ile														
			35				40						45	

Glu Glu Val Lys Lys Ile Thr Gly Glu Arg His Gly Lys Ile Val
 Arg 50 55 60

Ile Val Asp Val Glu Lys Val Glu Lys Lys Phe Leu Gly Lys Pro
 Ile 65 70 75
 80

Thr Val Trp Lys Leu Tyr Leu Glu His Pro Gln Asp Val Pro Thr
 Ile 85 90 95

Arg Glu Lys Val Arg Glu His Pro Ala Val Val Asp Ile Phe Glu
 Tyr 100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile
 Pro 115 120 125

Met Glu Gly
 130

<210> 19

<211> 131

<212> PRT

<213> Thermococcus gorgonarius

<400> 19

Met	Ile	Leu	Asp	Thr	Asp	Tyr	Ile	Thr	Glu	Asp	Gly	Lys	Pro	Val
Ile														
1				5					10					15

Arg	Ile	Phe	Lys	Lys	Glu	Asn	Gly	Glu	Phe	Lys	Ile	Asp	Tyr	Asp
Arg														
			20					25					30	

Asn	Phe	Glu	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Lys	Asp	Asp	Ser	Ala
Ile														
		35					40						45	

Glu	Asp	Val	Lys	Lys	Ile	Thr	Ala	Glu	Arg	His	Gly	Thr	Thr	Val
Arg														
	50					55					60			

Val	Val	Arg	Ala	Glu	Lys	Val	Lys	Lys	Lys	Phe	Leu	Gly	Arg	Pro
Ile														
65						70					75			
80														

Glu	Val	Trp	Lys	Leu	Tyr	Phe	Thr	His	Pro	Gln	Asp	Val	Pro	Ala
Ile														
				85					90					95

Arg	Asp	Lys	Ile	Lys	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Tyr	Glu
Tyr														
			100					105					110	

Asp	Ile	Pro	Phe	Ala	Lys	Arg	Tyr	Leu	Ile	Asp	Lys	Gly	Leu	Ile
Pro														
		115					120					125		

Met Glu Gly
130

<210> 20

<211> 131

<212> PRT

<213> Pyrococcus kodakaraensis

<400> 20

Met	Ile	Leu	Asp	Thr	Asp	Tyr	Ile	Thr	Glu	Asp	Gly	Lys	Pro	Val
Ile														
1			5						10				15	

Arg	Ile	Phe	Lys	Lys	Glu	Asn	Gly	Glu	Phe	Lys	Ile	Glu	Tyr	Asp
Arg														
			20					25					30	

Thr	Phe	Glu	Pro	Tyr	Phe	Tyr	Ala	Leu	Leu	Lys	Asp	Asp	Ser	Ala
Ile														
		35					40					45		

Glu Glu Val Lys Lys Ile Thr Ala Glu Arg His Gly Thr Val Val

Thr

50

55

60

Val Lys Arg Val Glu Lys Val Gln Lys Lys Phe Leu Gly Arg Pro
 Val
 65 70 75
 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala
 Ile
 85 90 95

Arg Asp Lys Ile Arg Glu His Pro Ala Val Ile Asp Ile Tyr Glu
 Tyr
 100 105 110

Asp Ile Pro Glu Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Val
 Pro
 115 120 125

Met Glu Gly
 130

<210> 21

<211> 131

<212> PRT

<213> Desulfurococcus Tok

<400> 21

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Met	Ile	Leu	Asp	Ala	Asp	Tyr	Ile	Thr	Glu	Asp	Gly	Lys	Pro	Val
Ile														
1				5					10					15

Arg	Val	Phe	Lys	Lys	Glu	Lys	Gly	Glu	Phe	Lys	Ile	Asp	Tyr	Asp
Arg														
			20					25					30	

Asp	Phe	Glu	Pro	Tyr	Ile	Tyr	Ala	Leu	Leu	Lys	Asp	Asp	Ser	Ala
Ile														
		35					40					45		

Glu	Asp	Ile	Lys	Lys	Ile	Thr	Ala	Glu	Arg	His	Gly	Thr	Thr	Val
Arg														
	50					55					60			

Val	Thr	Arg	Ala	Glu	Arg	Val	Lys	Lys	Lys	Phe	Leu	Gly	Arg	Pro
Val														
65						70					75			
80														

Glu	Val	Trp	Lys	Leu	Tyr	Phe	Thr	His	Pro	Gln	Asp	Val	Pro	Ala
Ile														
			85						90				95	

Arg	Asp	Lys	Ile	Arg	Glu	His	Pro	Ala	Val	Val	Asp	Ile	Tyr	Glu
Tyr														
			100					105					110	

Asp	Ile	Pro	Phe	Ala	Lys	Arg	Tyr	Leu	Ile	Asp	Arg	Gly	Leu	Ile
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Pro 115 120 125

Met Glu Gly
130

<210> 22

<211> 132

<212> PRT

<213> Thermococcus sp. 9°N-7

<400> 22

Met Ile Leu Asp Thr Asp Tyr Ile Thr Glu Asn Gly Lys Pro Val
Ile
1 5 10 15

Arg Val Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Tyr Asp
Arg
20 25 30

Thr Phe Glu Pro Tyr Phe Tyr Ala Leu Leu Lys Asp Asp Ser Ala
Ile
35 40 45

Glu Asp Val Lys Lys Val Thr Ala Lys Arg His Gly Thr Val Val
Lys
50 55 60

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Val Lys Arg Ala Glu Lys Val Gln Lys Lys Glu Phe Leu Gly Arg
Pro
65 70 75
80

Ile Glu Val Trp Lys Leu Tyr Phe Asn His Pro Gln Asp Val Pro
Ala
85 90 95

Ile Arg Asp Arg Ile Arg Ala His Pro Ala Val Val Asp Ile Tyr
Glu
100 105 110

Tyr Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu
Ile
115 120 125

Pro Met Glu Gly
130

<210> 23

<211> 131

<212> PRT

<213> Thermococcus litoralis

<400> 23

Met Ile Leu Asp Thr Asp Tyr Ile Thr Lys Asp Gly Lys Pro Ile
Ile
1 5 10 15

Arg Ile Phe Lys Lys Glu Asn Gly Glu Phe Lys Ile Glu Leu Asp
Pro

20

25

30

His Phe Gln Pro Tyr Ile Tyr Ala Leu Leu Lys Asp Asp Ser Ala
Ile

35

40

45

Glu Glu Ile Lys Ala Ile Lys Gly Glu Arg His Gly Lys Thr Val
Arg

50

55

60

Val Leu Asp Ala Val Lys Val Arg Lys Lys Phe Leu Gly Arg Glu
Val
65
80

70

75

Glu Val Trp Lys Leu Ile Phe Glu His Pro Gln Asp Val Pro Ala
Met

85

90

95

Arg Gly Lys Ile Arg Glu His Pro Ala Val Val Asp Ile Tyr Glu
Tyr

100

105

110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Ile
Pro

115

120

125

Met Glu Gly
130

<210> 24

<211> 161

<212> PRT

<213> Methanococcus voltae

<400> 24

Met	Asp	Leu	Asp	Tyr	Asn	Ser	Lys	Asp	Leu	Cys	Ile	Asp	Met	Tyr
Tyr														
1				5					10					15

Lys	Asn	Cys	Gly	Leu	Lys	Lys	Pro	Glu	Ile	Asn	Leu	Gln	Lys	Glu
Cys														
			20					25					30	

Glu	Phe	Lys	Pro	Tyr	Phe	Tyr	Val	Asp	Thr	Ser	Glu	Pro	Lys	Glu
Ile														
		35					40					45		

Tyr	Asp	Tyr	Leu	Asp	Gly	Leu	Asn	Gln	Glu	Ile	Asp	Leu	Lys	Lys
Leu														
	50					55					60			

Glu	Pro	Glu	Phe	Glu	Asn	Asn	Thr	Ser	Leu	Lys	Val	Gln	Asp	Leu
Ile														
65					70						75			

80

Thr Asn Ile Glu Ile Ile Glu Lys Ile Val Tyr Ser Asp Tyr Ile
Leu

85

90

95

Asn Gly Lys Asp Ile Ser Glu Val Ser Asp Phe Lys Asn Lys Lys
Glu

100

105

110

Arg Lys Ile Cys Lys Val Tyr Val Lys Tyr Pro Asn His Val Lys
Ile

115

120

125

Ile Arg Glu Tyr Phe Lys Glu Phe Gly Lys Ser Tyr Glu Phe Asp
Ile

130

135

140

Pro Phe Leu Arg Arg Tyr Met Ile Asp Gln Asp Ile Val Pro Ser
Ala

145

150

155

160

Lys

<210> 25

<211> 132

<212> PRT

<213> Pyrobaculum islandicum

<400> 25

Met	Glu	Leu	Lys	Val	Trp	Pro	Leu	Asp	Ile	Thr	Tyr	Ala	Val	Val
Gly														
1				5					10					15

Ser	Val	Pro	Glu	Ile	Arg	Ile	Phe	Gly	Ile	Leu	Ser	Ser	Gly	Glu
Arg														
			20					25					30	

Val	Val	Leu	Ile	Asp	Arg	Ser	Phe	Lys	Pro	Tyr	Phe	Tyr	Val	Asp
Cys														
		35					40					45		

Ala	Val	Cys	Glu	Pro	Ala	Ala	Leu	Lys	Thr	Ala	Leu	Ser	Arg	Val
Ala														
	50						55					60		

Pro	Ile	Asp	Asp	Val	Gln	Ile	Val	Glu	Arg	Arg	Phe	Leu	Gly	Arg
Ser														
65						70					75			
80														

Lys	Lys	Phe	Leu	Lys	Val	Ile	Ala	Lys	Ile	Pro	Glu	Asp	Val	Arg
Lys														
					85					90				95

Leu	Arg	Glu	Ala	Ala	Met	Ser	Ile	Pro	Arg	Val	Ser	Gly	Val	Tyr
Glu														
					100					105				110

Ala Asp Ile Arg Phe Tyr Met Arg Tyr Met Ile Asp Met Gly Val
Val
115 120 125

Pro Cys Ser Trp
130

<210> 26

<211> 131

<212> PRT

<213> Archaeoglobus fulgidus

<400> 26

Met Glu Arg Val Glu Gly Trp Leu Ile Asp Ala Asp Tyr Glu Thr
Ile
1 5 10 15

Gly Gly Lys Ala Val Val Arg Leu Trp Cys Lys Asp Asp Gln Gly
Ile
20 25 30

Phe Val Ala Tyr Asp Tyr Asn Phe Asp Pro Tyr Phe Tyr Val Ile
Gly
35 40 45

Val Asp Glu Asp Ile Leu Lys Asn Ala Ala Thr Ser Thr Arg Arg

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Glu
50

55

60

Val Ile Lys Leu Lys Ser Phe Glu Lys Ala Gln Leu Lys Thr Leu
Gly
65 70 75
80

Arg Glu Val Glu Gly Tyr Ile Val Tyr Ala His His Pro Gln His
Val
85 90 95

Pro Lys Leu Arg Asp Tyr Leu Ser Gln Phe Gly Asp Val Arg Glu
Ala
100 105 110

Asp Ile Pro Phe Ala Tyr Arg Tyr Leu Ile Asp Lys Asp Leu Ala
Cys
115 120 125

Met Asp Gly
130

<210> 27

<211> 135

<212> PRT

<213> Cenarchaeum symbiosum

<400> 27

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Thr	Val	Gln	Asp	Ala	Val	Glu	Ile	Pro	Pro	Ser	Leu	Leu	Val	Ser
Ala														
1				5				10					15	

Thr	Tyr	Asp	Ser	Gln	Ala	Gly	Ala	Val	Val	Leu	Lys	Phe	Tyr	Glu
Pro														
			20					25					30	

Glu	Ser	Gln	Lys	Ile	Val	His	Trp	Thr	Asp	Asn	Thr	Gly	His	Lys
Pro														
		35					40					45		

Tyr	Cys	Tyr	Thr	Arg	Gln	Pro	Pro	Ser	Glu	Leu	Gly	Glu	Leu	Glu
Gly														
	50					55					60			

Arg	Glu	Asp	Val	Leu	Gly	Thr	Glu	Gln	Val	Met	Arg	His	Asp	Leu
Ile														
65					70					75				
80														

Ala	Asp	Lys	Asp	Val	Pro	Val	Thr	Lys	Ile	Thr	Val	Ala	Asp	Pro
Leu														
				85					90					95

Ala	Ile	Gly	Gly	Thr	Asn	Ser	Glu	Lys	Ser	Ile	Arg	Asn	Ile	Met
Asp														
			100					105					110	

Thr	Trp	Glu	Ser	Asp	Ile	Lys	Tyr	Tyr	Glu	Asn	Tyr	Leu	Tyr	Asp
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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Lys 115 120 125

Ser Leu Val Val Gly Arg Tyr
130 135

<210> 28

<211> 133

<212> PRT

<213> Sulfolobus acidocaldarius

<400> 28

Trp Ile Lys Glu Ala Glu Asp Gly Lys Val Tyr Phe Leu Leu Gln
Val
1 5 10 15

Asp Tyr Asp Gly Lys Lys Ser Arg Ala Val Cys Lys Leu Tyr Asp
Lys
 20 25 30

Glu Gly Lys Lys Ile Tyr Ile Met Gln Asp Glu Ser Gly His Lys
Pro
 35 40 45

Tyr Phe Leu Thr Asp Ile Asp Pro Asp Lys Val Asn Lys Ile Thr
Lys
50 55 60

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Val	Val	Arg	Asp	Pro	Ser	Phe	Asp	His	Leu	Glu	Leu	Ile	Asn	Lys
Val														
65					70					75				
80														

Asp	Pro	Tyr	Thr	Gly	Lys	Lys	Ile	Arg	Leu	Thr	Lys	Ile	Val	Val
Lys														
				85					90				95	

Asp	Pro	Leu	Ala	Val	Arg	Arg	Met	Arg	Ser	Ser	Leu	Pro	Lys	Ala
Tyr														
			100					105					110	

Glu	Ala	His	Ile	Lys	Tyr	Tyr	Asn	Asn	Tyr	Val	Tyr	Asp	Asn	Gly
Leu														
		115					120					125		

Ile	Pro	Gly	Leu	Ile
130				

<210> 29

<211> 133

<212> PRT

<213> Sulfurisphaera ohwakuensis

<400> 29

Trp	Ile	Lys	Glu	Ala	Glu	Glu	Gly	Lys	Ser	Tyr	Phe	Leu	Leu	Gln
Val														
1				5					10					15

Asp	Tyr	Asp	Gly	Lys	Lys	Ser	Lys	Ala	Ile	Cys	Lys	Leu	Tyr	Asp
Lys														
			20					25					30	

Glu	Thr	Lys	Lys	Ile	Tyr	Ile	Leu	Tyr	Asp	Asn	Thr	Gly	His	Lys
Pro														
		35					40					45		

Tyr	Phe	Leu	Thr	Asp	Ile	Asp	Pro	Glu	Lys	Val	Asn	Lys	Ile	Pro
Lys														
	50					55					60			

Val	Val	Arg	Asp	Pro	Ser	Phe	Asp	His	Leu	Glu	Thr	Val	Ile	Lys
Ile														
65					70					75				
80														

Asp	Pro	Tyr	Ser	Gly	Asn	Lys	Ile	Lys	Leu	Thr	Lys	Ile	Val	Val
Lys														
				85					90				95	

Asp	Pro	Leu	Ala	Val	Arg	Arg	Met	Arg	Asn	Ser	Val	Pro	Lys	Ala
Tyr														
			100					105					110	

Glu	Ala	His	Ile	Lys	Tyr	Phe	Asn	Asn	Tyr	Ile	Tyr	Asp	Leu	Gly
Leu														
		115					120					125		

Ile Pro Gly Leu Pro
130

<210> 30

<211> 132

<212> PRT

<213> Sulfolobus solfataricus

<400> 30

Trp	Leu	Glu	Glu	Ala	Gln	Glu	Asn	Lys	Ile	Tyr	Phe	Leu	Leu	Gln
Val														
1				5					10					15

Asp	Tyr	Asp	Gly	Lys	Lys	Gly	Lys	Ala	Val	Cys	Lys	Leu	Phe	Asp
Lys														
			20					25					30	

Glu	Thr	Gln	Lys	Ile	Tyr	Ala	Leu	Tyr	Asp	Asn	Thr	Gly	His	Lys
Pro														
		35					40					45		

Tyr	Phe	Leu	Val	Asp	Leu	Glu	Pro	Asp	Lys	Val	Gly	Lys	Ile	Pro
Lys														
	50					55					60			

Ile	Arg	Asp	Pro	Ser	Phe	Asp	His	Ile	Glu	Thr	Val	Ser	Lys	Ile
Asp														
65					70					75				

80

Pro Tyr Thr Trp Asn Lys Phe Lys Leu Thr Lys Ile Val Val Arg
Asp
85 90 95

Pro Leu Ala Val Arg Arg Leu Arg Asn Asp Val Pro Lys Ala Tyr
Glu
100 105 110

Ala His Ile Lys Tyr Phe Asn Asn Tyr Met Tyr Asp Ile Gly Leu
Ile
115 120 125

Pro Gly Met Pro
130

<210> 31

<211> 133

<212> PRT

<213> Pyrodictium occultum

<400> 31

Lys Pro Leu Glu Ala Arg Asp Gly Val Glu Gly Phe Leu Leu Gln
Thr
1 5 10 15

Met Tyr Asp Gly Glu Arg Gly Val Ala Ala Ala Lys Ile Tyr Asp

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Asp

20

25

30

Arg Asn Gly Ile Val Tyr Val Tyr Phe Asp Arg Thr Gly Tyr Met
Pro
35 40 45

Tyr Phe Leu Thr Asp Ile Pro Pro Asp Lys Leu Gln Glu Leu His
Glu
50 55 60

Val Val Arg His Lys Gly Phe Asp His Val Glu Val Val Glu Lys
Phe
65 70 75
80

Asp Leu Leu Arg Trp Gln Arg Arg Lys Val Thr Lys Ile Val Val
Lys
85 90 95

Thr Pro Asp Val Val Arg Val Leu Arg Asp Lys Val Pro Arg Ala
Trp
100 105 110

Glu Ala Asn Ile Lys Phe His His Asn Tyr Ile Tyr Asp Tyr Gly
Leu
115 120 125

Val Pro Gly Met Lys
130

<210> 32

<211> 138

<212> PRT

<213> Aeropyrum pernix

<400> 32

Val	Arg	Glu	Pro	Trp	Val	Glu	Ser	Val	Arg	Gly	Tyr	Leu	Leu	Asp
Val														
1				5					10					15

Arg	Tyr	Asp	Gly	Ser	Leu	Gly	Lys	Ala	Val	Leu	Met	Leu	Tyr	Asp
Pro														
			20					25					30	

Ser	Ser	Gly	Ser	Leu	Val	Lys	Trp	Ala	Asp	Arg	Thr	Gly	His	Lys
Pro														
		35					40					45		

Tyr	Phe	Leu	Thr	Asp	Ala	Arg	Pro	Glu	Asp	Leu	Arg	Ala	Ala	Gly
Val														
	50					55					60			

Asp	Val	Ser	His	Asp	Glu	Ser	Phe	Leu	Gln	Tyr	Asp	Leu	Val	Glu
Lys														
65					70					75				
80														

Phe	His	Pro	Ile	Asp	Arg	Lys	Leu	Val	Lys	Leu	Tyr	Lys	Ile	Val
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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Val

85

90

95

Ser Asp Pro Leu Ala Val Arg Arg Leu Arg Glu Lys Val Ser Ser
Ala
100 105 110

Gly Phe Ser Val Trp Glu Ala Asp Ile Lys Tyr His His Asn Tyr
Ile
115 120 125

Phe Asp Arg Gln Leu Ile Pro Gly Ile Leu
130 135